

# 40 Year Projected Water Usage Report

## KANAB CITY

July 2014

WATER RIGHTS  
CEDAR CITY

**ALPHA**

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# Part I. Introduction

Kanab City currently serves approximately 2,000 culinary water connections. Due to recent changes in the law a 40 year plan must be prepared to show that existing water rights currently being held in reserve by the City will be required for future growth and development. The existing culinary water system is being fed from 23 springs and 18 Wells that are rotated during the winter and summer based on demand.

## Part II. Existing Water Usage

The estimated equivalent residential units ERU's for the community were estimated as follows:

TABLE 1 – KANAB CITY EQUIVALENT RESIDENTIAL UNITS (2013)

| Land Use          | Units    | No <sup>1</sup> | Demand <sup>2</sup> | ERUs       |       |
|-------------------|----------|-----------------|---------------------|------------|-------|
|                   |          |                 |                     | Multiplier | Total |
| Residential       | Dwelling | 1,760           | 800                 | 1          | 1,760 |
| Multiunit         | Dwelling | 94              | 800                 | 1          | 94    |
| High School       | Person   | 245             | 15                  | 0.0188     | 5     |
| Middle School     | Person   | 118             | 15                  | 0.0188     | 2     |
| Elementary School | Person   | 455             | 15                  | 0.0188     | 9     |
| Hotel             | Room     | 912             | 150                 | 0.1875     | 171   |
| Service Station   | Pump     | 67              | 250                 | 0.3125     | 21    |
| Restaurant        | Seat     | 1296            | 35                  | 0.0438     | 57    |
| RV Park           | Vehicle  | 94              | 100                 | 0.125      | 12    |
| Church            | Seat     | 1,733           | 5                   | 0.0063     | 11    |
| Nursing Home      | Bed      | 15              | 200                 | 0.5        | 8     |
| Doctor's Office   | Patient  | 100             | 10                  | 0.0125     | 1     |
|                   | Staff    | 15              | 35                  | 0.0438     | 1     |

| Land Use                                 | Units    | No <sup>1</sup> | Demand <sup>2</sup> | ERUs       |         |
|--|----------|-----------------|---------------------|------------|---------|
|  |          |                 |                     | Multiplier | Total   |
| Hospital                                 | Patient  | 30              | 10                  | 0.0125     | 0.38    |
|  | Beds     | 10              | 200                 | 0.5        | 5       |
|  | Staff    | 70              | 35                  | 0.0438     | 3       |
| Fire Station (volunteer)                 | Person   | 25              | 5                   | 0.0063     | 0       |
| Commercial                               | Building | 91              | 1,600               | 2          | 182     |
| Industrial                               | Building | 1               | 3,200               | 4          | 4       |
| Total Equivalent Residential Connections |          |                 |                     |            | 2,349.4 |

1 Number of units are estimates

2 Assumed Peak Day Demand per Unit in gallons for the purpose of calculating ERUs only

Using the total flow for the year ending in December 2013, the *average yearly demand per ERU* is 224,669 gallons (527,748,280 gallons/2,349 ERUs). The peak day demand for indoor use is estimated to be 219 gpd/ERU. This was derived by taking the total usage during the months of December of 15,934,114 gallons and dividing it by 31 days and 2,349 ERU's.

Assuming the peak day demand for outdoor and indoor water use is equal to the average daily flow of 2,551,413 gallons (76,542,400/30 days) in June of 2013, the *peak day demand for indoor and outdoor use* is 1,086 gpd/ERU. The *peak day demand for outdoor use* is 867 gpd/ERU (1,086 gpd – 219 gpd).

The results of the daily demands are summarized below.

- Peak day demand for indoor use: 219 gpd/ERU
- Peak day demand for outdoor use: 867 gpd/ERU
- Total peak day demand: 1,086 gpd/ERU
- Total average yearly demand: 224,669 gallons/ERU (0.690 acre feet/ERU)

## Part III. Projected Population

The growth rate in Kanab has varied greatly in the last 20 years depending on when the projections are taken but for the purposes of this report are estimated at 3.25%. Based on a 3.25% growth rate the projected population ERU's in 40

years would be 8,443. With this number of ERU's the peak flow requirement would be 6,367 gpm.

An estimate of the Kanab City population at build-out (when all vacant land within the city limits has been developed) has also been prepared. The calculations along with the estimated build-out population for Kanab City are summarized in following table taken from the Capital Facilities Plan.

TABLE 2 – KANAB CITY ESTIMATED BUILDOUT POPULATION

| Type of Use <sup>1</sup>      | Acres | Units/<br>Acre | Units<br>at<br>Build-<br>out | Build-out<br>Population <sup>3</sup> |
|-------------------------------|-------|----------------|------------------------------|--------------------------------------|
| <i>West of Kanab Creek</i>    |       |                |                              |                                      |
| Very low density <sup>2</sup> | 535   | 0.4            | 214                          | 505                                  |
| Very low density              | 1,209 | 1              | 1,209                        | 2,853                                |
| Low density <sup>2</sup>      | 124   | 2              | 248                          | 585                                  |
| Low density                   | 384   | 3.5            | 1,344                        | 3,172                                |
| Medium density <sup>2</sup>   | 557   | 1.5            | 836                          | 1,972                                |
| Total                         | 2,809 |                | 3,851                        | 9,087                                |
| <i>East of Kanab Creek</i>    |       |                |                              |                                      |
| Very low density              | 2,242 | 1              | 2,242                        | 5,291                                |
| Low density <sup>2</sup>      | 514   | 2              | 1028                         | 2,426                                |
| Low density <sup>2</sup>      | 130   | 2.64           | 343.2                        | 810                                  |
| Low density                   | 1,771 | 3.5            | 6198.5                       | 14,628                               |
| Medium density                | 45    | 1.5            | 67.5                         | 159                                  |
| Medium density                | 133   | 7              | 931                          | 2,197                                |
| Planned unit<br>development   | 422   | 15             | 6330                         | 14,939                               |
| Total                         | 5,257 |                | 17,140                       | 40,451                               |
| Combined Total                | 8,066 |                | 20,991                       | 49,538                               |

1 Table includes only zones where dwellings are allowed.

2 Modified to show actual densities where development has occurred.

3 Persons per household assumed to be 2.36 based on culinary water account data supplied by the city of Kanab

Based on 2.36 persons per household the buildout ERU's will be approximately 20,990. The water rights required to provide for this population would be a peak flow of approximately 15,830 gpm and a total diversion of 14,473 acre feet.

## Part IV. Existing Water Rights

The following table is a summary of existing water rights owned by Kanab City with their current status.

TABLE 3 – KANAB CITY EXISTING WATER RIGHTS

| Water Right | Priority | Diversion Points   | Flow (cfs) | Flow (gpm) | Acre-feet | Status          |
|-------------|----------|--|------------|------------|-----------|-----------------|
| 85-28       | 1956     | Wells  | 0.448      | 201        | 324.56    | Certificated    |
| 85-39       | 1956     | Well (Highway 89 Well)   | 0.885      | 397        | 641.15    | Certificated    |
| 85-55       | 1963     | Well #11   | 1          | 449        | 724.46    | Certificated    |
| 85-59       | 1964     | Wells  | 1.81       | 812        | 1,311.28  | Certificated    |
| 85-112      | 1864     | Springs: Trough, Big, Cave 1&2, Cold, Iron 1&2, Little, Robinson, Slab, Slide, South, Twin, Weeping, Willow, Boiling, Head 1&2, Spring 1&2 | 0.5        | 224        | 362.23    | Diligence Claim |
| 85-703      | 1896     | City Chicken Spring  | 0.033      | 15         | 23.91     | Diligence Claim |
| 85-736      | 1962     | Wells  | 0.93       | 417        | 673.75    | Certificated    |
| 85-772      | 1977     | Wells  | 3.48       | 1562       | 2,521.13  | Certificated    |
| 85-946      | 1975     | Wells  | 3.02       | 1355       | 2,187.88  | Application     |
| 85-956      | 1962     | Well #14   | 1.5        | 673        | 1,086.69  | Certificated    |
| Totals      |          |  | 13.606     | 6,106.79   | 9,857.04  |                 |

## Part V. Conclusion

With their current water rights, Kanab City can deliver a peak day demand 6,106 gpm with all of their rights being used. This is close to the projected peak day demand of 6,367 gpm based on a 3.25% growth rate over the next 40 years. It is anticipated that to service a build-out population of 49,538 residents with a peak day demand of 15,830 gpm and an annual flow of 14,473 acre feet that Kanab City will need to continue actively acquiring water rights to serve the future needs of its citizens. This includes both surface and subsurface rights.

|                          | Jun-13        | Dec-13        | 2013           |           |
|--------------------------|---------------|---------------|----------------|-----------|
| Cave Lakes Spring Area   | 10.7          | 11.8          | 134.6          |           |
| Cave Lakes Well No.5     | 0             | 0             | 0              |           |
| Chicken Canyon Well No.4 | 0             | 0             | 16.9           |           |
| City Spring (Chicken Sp) | 0             | 0             | 0              |           |
| Hinckley Well No.13      | 55.6          | 0             | 313.6          |           |
| Mace Well No.2           | 0             | 9.5           | 68.1           |           |
| School Well No.11        | 0             | 19.7          | 100.8          |           |
| Three Lakes Well No.12   | 50.2          | 0             | 95.3           |           |
| Well No. 15              | 0             | 7.9           | 31.5           |           |
| Well No.1 (#9)           | 0             | 0             | 0              |           |
| Well No.14               | 45.1          | 0             | 293.8          |           |
| West Fork Well #1        | 0.9           | 0             | 191.2          |           |
| West Fork Well #2        | 6.4           | 0             | 65.9           |           |
| West Fork Well #3        | 5.1           | 0             | 39.4           |           |
| West Fork Well #4        | 60.9          | 0             | 268.5          |           |
| West Fork Well #5        | 0             | 0             | 0              |           |
| Totals                   | 234.9         | 48.9          | 1619.6         | Acre-feet |
| Totals                   | 76,542,399.90 | 15,934,113.90 | 527,748,279.60 | Gallons   |